

Cytology of rusts.—In 1912 OLIVE¹² described an intermingling of perennial gametophytic and sporophytic mycelia of *Puccinia obtegens* throughout the host plant. In a new contribution¹³ he shows the same condition to hold in two other species, *Puccinia Podophylli* and *Uromyces Glycyrrhizae*. This intermingled growth gives rise to spermagonia, which are followed by aecidiospores and finally by teleutospores in *P. Podophylli*, or by confluent uredosori and teleutosori in *P. obtegens* and *Uromyces Glycyrrhizae*. In the young spring shoots of *P. Podophylli* the order is usually reversed, teleutospores and aecidiospores appearing on the leaf sheaths, and later aecidia and spermagonia on the young leaves.

The mycelium in the leaf sheath is prevailingly binucleate. In the young leaves the uninucleate (gametophytic) mycelium prevails, while in older leaves the binucleate (sporophytic) mycelium becomes predominant. The aecidiospores of *P. Podophylli* and the uredospores of *P. obtegens* and *Uromyces Glycyrrhizae* are all regarded as secondary in origin and thus apogamously derived, arising solely from the binucleate mycelium, as the reviewer¹⁴ formerly pointed out in the first mentioned case. No sexual fusions were found in the young sori in which the mingled gametophytic and sporophytic mycelia occur. The binucleate cells of the sporophyte push in among the uninucleate hyphae of the gametophyte and there form spores directly. OLIVE believes this apogamous condition to be a result of the perennial habit.

The spermatia alone arise from the uninucleate gametophytic mycelium, although binucleate hyphae often invade the immediate neighborhood of the spermagonia. The reviewer, being unaware of this curious mixture of the two kinds of mycelium, in which binucleate hyphae may become predominant, was led to believe the spermatia, like the apogamous aecidiospores, might arise from the binucleate mycelium. The basal cells and spermatia in which he saw more than one nucleus may have been irregularities without particular significance.

Besides the intermingled condition described, two other states of mycelial distribution were observed: (1) an unlimited growth of the perennial sporophytic mycelium alone in *P. obtegens* and *Uromyces Glycyrrhizae*, producing only secondary uredospores and teleutospores in confluent sori, and (2) a localized distribution of the binucleate sporophytic mycelium, giving rise to a sorus of teleutospores in *P. Podophylli*, or in the other two species to the localized "summer generation" or "repeating generation," producing secondary uredospores and teleutospores.—L. W. SHARP.

¹² OLIVE, E. W., Perennial gametophytic and sporophytic generations in *Puccinia obtegens* (Lk.) Tul. Science 35:150. 1912.

¹³ OLIVE, E. W., Intermingling of perennial sporophytic and gametophytic generations in *Puccinia Podophylli*, *P. obtegens*, and *Uromyces Glycyrrhizae*. Ann. Mycol. 11:297-311. pl. 15. 1913.

¹⁴ SHARP, L. W., Nuclear phenomena in *Puccinia Podophylli*. BOT. GAZ. 51:463, 464. 1911.